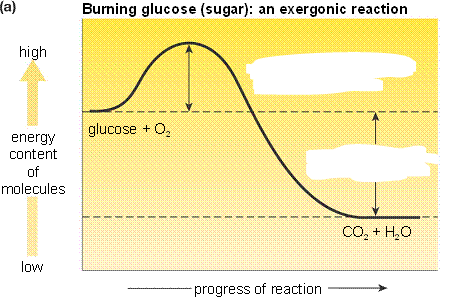
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**Must-Knows: Unit 6 (Enzymes and Cell Respiration)**

Ms. OK, AP Biology, 2014-2015

**Test Format:** 29 multiple choice questions, 1 short response question

**Topic #1: Enzymes**

1. How are competitive and noncompetitive inhibition of enzyme action different from one another? What are they both used to do?
2. Compare / contrast negative and positive feedback.
3. In negative feedback, does the end product of a multi-step reaction typically inhibit an enzyme involved in an earlier or later step of the reaction? Why?
4. How does an enzyme affect the activation energy of a reaction? How does an enzyme affect the ΔG (change in free energy) of a reaction (i.e. the change in energy from the reactants to the products)? Label the activation energy (EA) and change in free energy (ΔG) of the reaction shown in the graph to the right.
5. How does boiling an enzyme (i.e. subjecting it to extreme temperature changes) affect its ability to catalyze (speed up) a reaction?
6. How does decreasing the temperature affect an enzyme’s ability to catalyze a reaction?
7. Why does denaturation of an enzyme affect its ability to bind to the substrate(s)?
8. Which of the following could you use to measure the rate of an enzyme-catalyzed reaction (circle all that apply)?
9. The amount of enzyme
10. The rate of substrate destruction
11. The rate of product formation

9. Why does the rate of an enzyme-catalyzed reaction stop increasing at very high substrate concentrations?

**Topics #2 and #3: Aerobic and Anaerobic Cell Respiration**

10. What evidence do scientists have to indicate that glycolysis is an ancient process?

11. What are the reactants (starting molecules) and products (ending molecules) of glycolysis?

12. Describe the amount and type of ATP production during glycolysis. (Note: The type of ATP production refers to substrate-level phosphorylation vs. oxidative phosphorylation.)

13. What are the reactants (starting molecules) and products (ending molecules) of the intermediate step between glycolysis and the Krebs / citric acid cycle in which pyruvate is converted to Acetyl CoA?

14. What are the reactants (starting molecules) and products (ending molecules) of the Krebs / citric acid cycle?

15. After the Krebs cycle, how is most of the energy from the original glucose molecule stored?

1. How are high-energy electrons from NADH and FADH2 used during the electron transport chain?
2. How is oxygen gas (O2) used during the electron transport chain?
3. Why are their folds (aka cristae) in the inner mitochondrial membrane?
4. Define “proton motive force.” How is this used during the electron transport chain?
5. How is oxidative phosphorylation / chemiosmosis (the type of ATP production that occurs in the electron transport chain) different from substrate-level phosphorylation? Is there more or less ATP made during oxidative phosphorylation than substrate-level phosphorylation?
6. How is aerobic respiration different from anaerobic respiration (aka fermentation)? Which steps of aerobic respiration (i.e. glycolysis, the conversion of pyruvate to acetyl CoA, the Krebs cycle, or the electron transport chain) occur during anaerobic respiration?
7. Why does NAD+ need to be regenerated from NADH for glycolysis to continue? How is this accomplished in lactic acid fermentation vs. alcoholic fermentation?
8. In what types of organisms / cells does each type of fermentation occur?

**Science Skills**

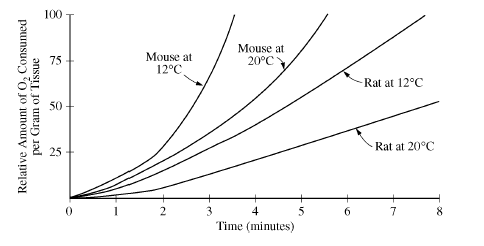
An experiment to measure the rate of respiration in crickets and mice at 10°C and 25°C was performed using a

respirometer, an apparatus that measures changes in gas volume. Respiration was measured in mL of O2

consumed per gram of organism over several five-minute trials and the following data were obtained.

1. How will carbon dioxide produced by the crickets and mice affect the measurements of average respiration (mL O2 / g / min)?
2. Why do you think the rate of respiration is higher at lower temperatures for mice?
3. If mice are endotherms (regulate their temperature by using the energy from ATP to generate body heat) and crickets are ectotherms (regulate their temperature using behaviors like basking in the sun), how do you explain the difference in rate of respiration for mice vs. crickets at both 10 degrees Celsius and 25 degrees Celsius?

A respirometer is a container used to measure the amount of oxygen consumed by an organism. A respirometer was used to determine how environmental temperature affects the uptake of oxygen in one 300-gram rat and one 50-gram mouse. The results of this experiment are shown on the graph below.



1. From the data given above, what can you conclude about the effect of temperature and body mass on the rate of cellular respiration?